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THE PSYCHOPHYSICAL CONTINUUM

IN a recent discussion of the relational view of consciousness[1] Mr. Marshall takes occasion to reaffirm the familiar distinction between the "natural order" and the "mental order." In the natural order he places the "stream of appreciations of the existence of what we in thoughtful reflection come to call objects in the outer world; the chair, the table, the fireplace, etc." But in addition to this stream "there are discovered items which are felt to be of a different order. . . . The three items, warmth, desire, belief, may be taken as typical of innumerable instances of these appreciations of existences which . . . are usually grouped together as items within what we may call the mental order, or what is usually spoken of as consciousness." Mr. Marshall seems to feel that there is a real gulf fixed between these two orders, and that the existence of this gulf constitutes also a barrier between the study of behavior and the study of consciousness.

It occurs to me that the whole matter may be much simplified by recognizing the purely statistical character of the distinction and by noting that there is as a matter of fact not a gulf, but a gradual transition and continuity between the two so-called orders. It is true that in daily conversation and also in common psychological classification we emphasize the natural as opposed to the mental, the cognitive as over against the affective and conative. But so also do we distinguish between black and white, long and short, and between various other ends of continuous series. It seems to me that psychological classification, and hence both psychological and epistemological theory, have suffered from the uncritical acceptance of purely practical distinctions, based on the statistical features of the experiences indicated, and that epistemology will be relieved and psychology clarified by having the points noted, even if in a rather naïve and amateurish way, unembellished by metaphysical vocabulary.

To begin with, the objects constituting the natural order are put there merely because of the universality of their occurrence. When one of us experiences table, fireplace, etc., and our fellows are interrogated, a universal affirmative verdict is assured,—all or nearly all of them report the same experience. Or on different occasions I myself continue to report it. At least the conditions required for such a verdict are rather easily satisfied,—it requires merely that the light be turned on, that a curtain be withdrawn, etc. But when I report the presence of desire, belief, emotion, etc., and interrogate my fellows, the affimative reports are likely to be fewer,—I may be alone in my testimony, I may receive the confirmation of a few intimate associates, or indeed a fairly large group may agree with my report—"Anger is now experienced." But the verdict is far from universal, and it is furthermore difficult to arrange the conditions for such a verdict, if not indeed impossible. It may require a long course of neuro- or psycho-therapy.

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[1] This JOURNAL, Vol. X., page 477.

Sometimes, indeed, when a closed circle of associates is concerned, an emotion, a desire, etc., may be universally reported. On such occasions the reported experience takes its place in the natural order and is designated by an object-name, as The Holy Ghost, The Spirit of the Lord, etc. This is particularly true when the experience is not one of the routine sort, but depends on some rather rare condition or set of conditions. The fever, the plague, beauty, are other instances. Such experiences are given full objectivity in our table talk, in economics, sociology, and history. The plague "is spreading," "is being combated," etc. The fever "is identified," "is restricted to a certain area," etc. Disease entities, complexes of "pathological" experiences, very nicely illustrate the transition region between the natural and the mental orders. The reason for this is obvious—it is usually fairly easy to effect the conditions requisite for a universal or widespread report of symptoms. Medical prophylactics is mainly engaged in maintaining a set of conditions which will justify us in classifying the various diseases as objects of the mental order. Religious zeal of a certain kind, on the other hand, is chiefly engaged in perpetuating or reviving conditions which will induce us to classify various "emotions" as objective existences in the natural order.

Esthetic experiences again easily come to have objective character, because such large groups of observers report identical objects. Thus beauty, ugliness, sublimity, harmony, are not classified as peculiar modifications of the self, as are anger, fear, and perplexity,—they are properties of objects, they are assigned existence well down toward the "natural" end of the continuum of experience. Only an international experience suffices to convince one that the beauty of a given art form is not as intrinsic and fundamental as is the resistance of a solid object, or the brilliance of a pencil of homogeneous ether waves.

Analytic psychology, again, in its attempt to pigeonhole those experiences which are mainly toward the "mental" end of the series, gives us such rubrics as feeling, belief, judgment, perception, and in the past has assumed the existence of certain qualitative differentia between the experiences thus named. But it should be noted that every "introspective" attempt to formulate the ear-marks of the variously named experiences has resulted in failure, and in the conclusion that all these experiences merge into each other, that, in fact, in Mr. Marshall's words, consciousness is "a complex of diverse emphases within a whole psychic pulse" and that "in so far as these emphases display observable characteristics, the average man gives them special names, *e. g.*, 'thoughts,' 'desires,' 'believings,' 'emotions,' 'sensations,' etc."

As a matter of fact the observable characteristics, so far as used in psychological classification, are chiefly statistical. Thus I am said to "perceive" an object, a difference, a relation, etc., when the greater part of the total distribution of observers or observations make a similar report. I am said to make a "judgment" of difference when the verdicts, either of other observers or of my own repeated reports, are frequently contradictory. Sometimes, to be sure, another factor is considered, viz., the degree of confidence of the report, that is, the briskness of formulation, the speed with which the object or situation develops, and the clearness or intensity which it finally displays. Thus when a visual object develops quickly and in an orderly way and when motor adjustments, in the form of handling, naming, etc., develop in a definite and standardized form, I say I *perceive* an object, but this is chiefly on the basis of the fact that in the long run I have found that this sort of an object or situation is one which will be universally reported. But if the object develops slowly or irregularly or if the handling or naming reactions are uncertain or uncoordinated or novel, I am likely to say "I *feel* it" to be such and such an object, I *judge*, I *believe* it, etc.

Thus in laboratory experiments on the differential threshold, various degrees of confidence are likely to be reported in some such way as the following:

(*A*) If the difference is exceedingly small, so small that its direction is not evident, though its existence is suggested, the observer is likely to report that he *feels* a difference.

(*B*) If the difference is increased somewhat, not only will the existence of a difference be reported, but its direction will also be asserted, though the observer reports the direction not to be absolutely constant, but to vary from moment to moment. He will then be said to be *judging* the difference.

(*C*) Increase the difference still more and the observer will report a difference which continues to have the same direction through successive trials or inspections. He then holds a *belief* with respect to the difference, a belief, be it noted, which may not accord with the objective conditions[2] because of the presence of certain constant errors or motives to illusion.

(*D*) A larger difference still will be said to be *perceived,* since it is not only clear, but its direction is consistently reported and coincides with the consensus of other estimates or verdicts or with those estimates which are so universal that they have been standardized as objective.

Now if requested, the observer can easily indicate the various types of report by the four degrees of confidence, *D, C, B,* and *A,* and more degrees than this he will hardly find possible. Furthermore, his various percentages of correctness will be found to be about 60, 70, 80, and 95. Or if different observers are used and their reports compared, similar differences will be found in the variability of their reports. In other words, here we have, in the case of the same general situation, four distinguishable types of report, which we name, respectively, feeling, judgment, belief, and perception. They are distinguished from each other only by the universality of their verdicts. In the same way, we never say that an observer judges the sun to be rising, or feels or believes it to be rising, unless he is reporting under circumstances which would produce varying reports from different observers or from the same observer in different trials. So also, one *perceives* that water extinquishes fire, *believes* that honesty is the best policy, *judges* that the defendant is guilty, and *feels* that a given blue is more agreeable than a given green.

It is not uninteresting to note that there is a larger gap, from the point of view of percentage of correctness, between the *A* and the *B* judgments than between the other degrees of confidence. This reflects the sharp distinction which we have made in practical life between the natural and the mental order, between perception and belief.

It should be noted that there are here only two factors which have qualities; one is the object, the other is the organism. There is no need for *sensation* or for *consciousness* which is other than, inside of, or in addition to, the object-organism complex.

It may be asserted that in addition to these purely statistical differences between these various types of experience, there are other differences of a purely qualitative sort. Thus it is often said that the feelings have a peculiar warmth, intimacy, and personal character, which perceptions do not have; that they are felt as modifications of the self rather than as qualities of objects, etc. It should be observed in the first place that such statements, if they are intended as universal propositions, are false. The Holy Ghost is felt to be, not a personal modification of the self, but a real entity abroad in the land, in the same land where stalks the Panic, the White Plague, the Measles, the Cold Weather, and where are found the melody, the difference tones, the stars, and the apple blossoms.

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[2] By objective conditions we mean, of course, only the reports of observers who have fuller means of examination and comparison, the consensus of all other estimates. By "the stimulus" is meant only the object as known in some other way, by some other person, or on some other occasion.

In the second place, this personal and private characterization of the affective, relational, and conative experiences is but an obscure way of pointing out their statistical limitations, their relative lack of clearness and persistence, and the unfamiliar and unanticipated nature of the adjustments to them. Experiences, to be sure, display many points of difference, afford various categories of predication, but along with the differences I have pointed out they are thoroughly "natural" differences and should all be treated in the same objective way. A desire differs in many details from a joy, and in still further ways from a color. But so does my fountain pen differ in many ways from a whiff of smoke, an itch, an oyster, a glass of lemonade. The Holy Ghost Experience, for example, is more like an odor, or a melody, or an itch, than it is like jealousy or hatred.

Diverse as are the ways in which experiences differ, various as are the relations which experience affords, they are all equally natural and equally mental. They are all, in other words, psychophysical; psychical in so far as they are indefinite and rare, physical in so far as they are definite and common. And it is highly probable that their definiteness is largely a function of the frequency with which they are met.

The physical world, with which the physical sciences deal, and for which are developed the various shorthand symbols by which we designate the objects as independent of experience, consists of those experiences which are statistically common. The independence of these objects, their stubbornness, their resistance, their objectivity and naturalness, these all are not unique characteristics which suffice to split experience in two, they are merely various and interesting ways of stating the same statistical fact. The dependence, the subjectivity, the personal character of other experiences, the so-called mental order, are merely literary terms which express their statistical limitations and their consequent vagueness and complex conditions of appearance. The intermediate zone, comprising those experiences with only average statistical possibilities—the diseases, the communistic sentiments, the fervent local emotions, the qualities afforded by the proprioceptors, such experiences as panic, ague, beauty, warmth, etc.—have been strangely neglected by our classifiers.

It may seem strange that in the case of the objects at the one end of the curve of distribution we have failed to develop conceptual names, such as are used in the physical sciences to connote the occurrence or possibility of general statistical experience. But there should be no difficulty in seeing why this is true. The same tendency is to be seen even among those experiences which we have come to call natural objects. When only one or two catastrophes of a given kind occur in history or in life we need no general concept such as electricity, etc., by which to refer to them. Each receives its Christian name, such as the Burning Bush, the Star of Bethlehem, the Aurora Borealis. But when such experiences assume larger statistical proportions, and resemblances are detected, physical sciences develop generic symbols for their reference, and these symbols become, in proportion to their statistical necessities, the eternal verities of reality as distinguished from appearance. In the same way the early apostles, impressed by the locally common experience of certain religious ecstasy, conceptualized its various occurrences, and the Holy Ghost was born. But for the failure of adequate statistical verification this object would have taken its place along with electricity and the ether as an eternal verity.

When a majority of properly equipped astronomers report the appearance of a new sun-spot, no problem is afforded the psychologist thereby. The phenomenon is felt to belong to the physical sciences. But when only one astronomer reports the celestial novelty, and his fellow observers, under the same general conditions, make no such report, the psychologist is at once interested. The event has taken its place in the mental order, rather than in the natural order.

In this sense, and in this sense alone, psychology may properly be defined as the science of behavior,—it is the science of the behavior of statistically variable experience. The symptoms of a disease, the manifestations of an emotion, and the relational features of various other experiences, these correspond to the properties or qualities of objects. All sciences are studies of behavior. The subject-matter is determined by the statistical facts alone.

There remains, perhaps, in some mind, the old riddle presented by physiological psychology. The neurologist and brain anatomist point out that those experiences which we call sensory depend on the peripheral stimulation of certain of the nerves of an organism; that the cognitive processes depend on the elaboration of these nervous processes by their fusion with synchronous processes from other nerves and by the habits imposed upon brain centers by virtue of previous activity. He finds special cortical areas involved when we have those experiences which we place in the natural order,—the sensory qualities, the objects, etc. The so-called affective, relational, and conative experiences he says are not found to depend on such specialized centers; they arise in some way from the interrelation of these various mechanisms and their correlated motor paths of egress. They are generated, not by physical stimuli, directly, but they reflect merely the condition of the organism at the time—the amount of energy at its disposal, the facilitating or inhibiting relations of neural tendencies, the metabolism of the tissues, the liveliness of the nervous impulse, general tonus, etc. Hence they have no reference to the natural order, these inner mental experiences; they are subjective and thoroughly illusory if taken to be items in a real world. Pleasures, beliefs, emotions, relations, are tertiary qualities and to be sharply distinguished from the objects of cognition.

Similarly with the secondary qualities, such as color, taste, warmth, etc. He reports no trace of color or taste or heat in the impulses that travel inward from the periphery, whether in the intermedia or in the nerves themselves. These qualities, he tells us, are secondary and reveal not the properties of the natural world, but the way in which the objects of that world affect certain sorts of protoplasm in the cortex. The primary qualities of resistance and extension, and perhaps of change and duration, are the sole experiences which reveal reality. The real world he says is not beautiful, nor is it angry, nor is it even colored or fragrant. These are purely mental qualities which psychology may study since the other sciences are busy with more important matters.

To such a person, be he neurologist, metaphysician, or what not, there is only this to say. The reason he can not see the color in my optic nerve is that he is looking at it flatwise. If he could only look through it endwise as I do he would see objects that are just as colored as they are ponderable when observed through the nerves of his tendons and muscles and joints. Of course he can not see the colored object if he persists in looking at my gray matter. If he would look at the object the chances are 1,000 to 1 that he would report a color experience. The chances are 10 to 1 that he would also report a beauty experience. The difference in the chances is what justifies me in calling the one more mental than the other. If he will reach out his hand, the chances are 1,000,000 to 1 that he will report an experience of resistance. That is why I call resistance a physical fact. The chances are about even that he would like to use the object for some purpose or other, and this low probability is what I mean by saying that desire is a very subjective and highly mental experience.

The air waves which strike my tympanum our physiologist carefully scrutinizes. He reports that he *sees* no noise there, nor even in the temporal lobe of my brain, which, when removed, condemns me to a noiseless experience. Certainly not, for noise can not be seen. If he will put his ear where mine is the chances are 1,000 to 1 that he will report a noisy experience, 10 to 1 that he would call it disagreeable, 2 to 1 that he would try to avoid it.

It is of course easy to be wrong in a case of this kind. It will generally be assumed, no doubt, that judgments are not distinguished from perceptions *because of* their statistical differentia, but rather that the relative frequencies of the two types of experience *follow from* certain more essentially qualitative differences. This is just the proposition I am denying. What I mean to say is just that the statistical differences are the sole criteria of classification. As soon as an experience hitherto called a judgment becomes a common judgment it is at once called a perception, and this with no change whatever in its qualitative characteristics.

The fact that objects display certain relations and interrelations which do not characterize such experiences as emotion or desire is on a level with the fact that some objects are organic, others not, some objects positively charged, others not. Many experiences of the natural order, such as odors, sounds, do not possess the property of extension and do not easily fall under relations of distance and direction, yet these experiences are not classed as modifications of the self,—they are almost as completely objectified as the visual and tactual experiences. That they are not quite so fully objectified is due solely to their greater statistical variability.

Cortical changes, the dance of molecules in the brain, may be requisite for all kinds of experience. Some of these changes are visible, some audible or tangible or enjoyable or desirable or comparable, etc., to the organism in which the changes take place. But what does it signify if the neurologist discovers that visible experiences of color, for me, are accompanied by visible experiences of dancing cortical molecules in my occipital lobe, for him? Or that when I am getting auditory experiences he may be getting tactual experiences from the string he has glued to my tympanum. All that this means is that when one organism has certain experiences, another organism, in rather different circumstances, always gets certain other experiences. Such correlations of experience are common. My failure involves your self complacency, my joy is correlated with your jealousy, etc. Experience is full of correlations and it is the business of the various sciences to discover them and to record them. Once this is completely done, there is nothing else to do but sit down and take experiences as they come. But the correlation of what we call a mental fact with what we call a physical fact is no more mysterious than, and is the same in kind as, any correlation between two physical or between two mental facts.

Each experience will be found to require varied attendant experiences, or what we call conditions. Some of these conditions will be found common to all organisms, and the correlated experiences, with high statistical frequency, will form the "natural" order, and will be studied by the physical sciences. Other experiences will be found to depend on sets of conditions, attendant experiential complexes, which occur much less often, less easily, but may sometimes be found frequent in certain special groups or localities. These we will call affective, epidemic, social experiences. Sociology, medicine, esthetics, and ethics will study them. Many experiences will be found to depend on fine adjustments and close connections of attendant circumstances. These will occur still less commonly and will constitute the general subject-matter of psychology.

But there will be throughout no gulf between psychical and physical, between the natural and the mental orders. It is as meaningless to ask, "Does consciousness exist?" as it is to ask, "Does nothing exist but consciousness?" It is quite unnecessary to insist on giving up either one end of the experience continuum or the other end. It is equally unnecessary to talk about the two extremes as if they were fundamentally and qualitatively different sorts of being, displaying a mysterious and inexplicable dualism or parallelism or interaction or identity or what not. All experiences take their place in the surface of frequency and the differences between them are not a matter for mystical rumination, but for such attempts at correlation as those in which the empirical sciences are engaged.

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REVIEWS AND ABSTRACTS OF LITERATURE

The Psychological Researches of James McKeen Cattell. A Review by Some of his Pupils. New York: The Science Press. 1914. Pp. 101.

The purpose of this little volume is indicated in its foreword: "The pupils of Profesor James McKeen Cattell, wishing to recognize in some public way his completion of twenty-five years of service as professor of